

Chemistry 334

Examination #1

July 20, 2009

Professor Charonnat

Name: _____

Be certain that your examination has eight (8) pages including this one.

Put your name on **each** page of this examination booklet.

By putting your name on this examination booklet you agree to abide by California State University, Northridge policies of academic honesty and integrity.

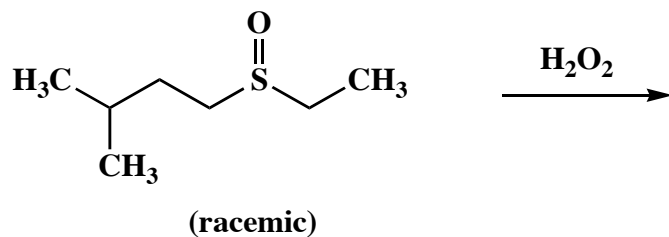
Molecular models are allowed for this examination. All electronic devices, including calculators, are unnecessary and are not allowed.

Name: _____

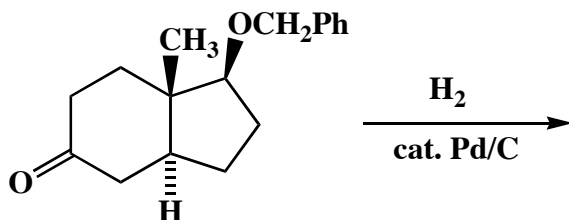
1. (25 points)

Draw the structure of the expected major organic product for each of the following five (5) questions. Specify stereochemistry clearly, if relevant.

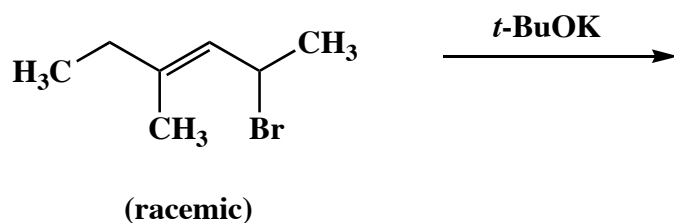
A.



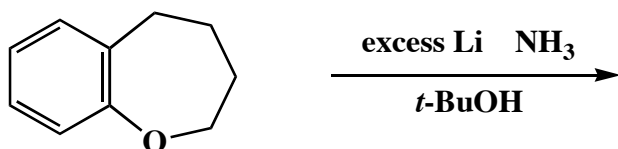
B.



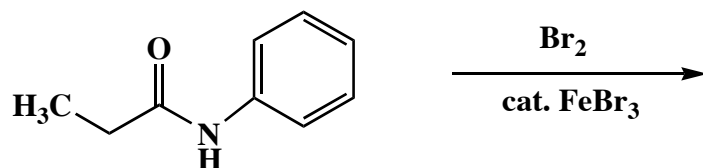
C.



D.



E.

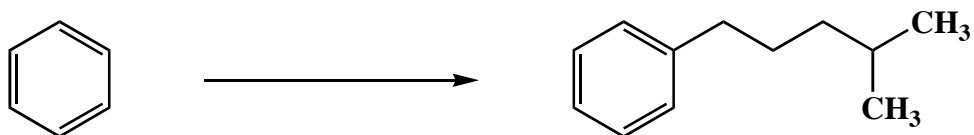


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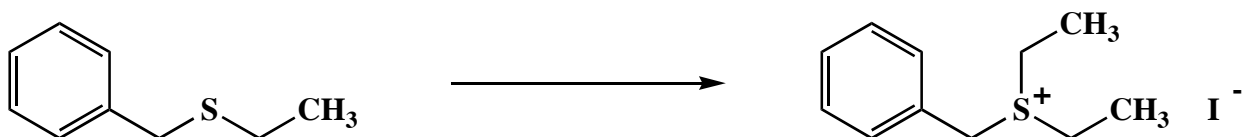
2. (25 points)

Draw the specific reagent(s) necessary to effect the following three (3) transformations. If more than one reaction is involved in an answer, be certain to distinguish the individual steps clearly.

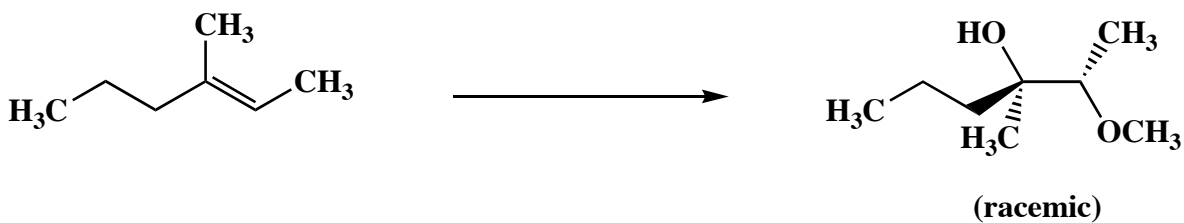
A.



B.

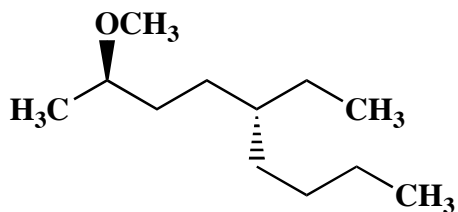


C.



3. (10 points)

Use IUPAC nomenclature to write the systematic name of the following ether.



Name: _____

4. (25 points)

Circle the number that corresponds to the correct answer for each of the following five (5) questions.

A. The reaction of (*Z*)-penta-1,3-diene with methyl acrylate ($\text{H}_2\text{C}=\text{CHCO}_2\text{CH}_3$) primarily affords

1. the *cis*-1,2 adduct
2. the *trans*-1,2 adduct
3. the *cis*-1,3 adduct
4. the *trans*-1,3 adduct

B. The allyl carbocation possesses

1. one bonding molecular orbital
2. two bonding molecular orbitals
3. three bonding molecular orbitals

C. Iodobenzene is less reactive than benzene in electrophilic aromatic substitution reactions because the iodo substituent

1. withdraws electron density inductively
2. withdraws electron density by resonance
3. donates electron density inductively
4. donates electron density by resonance

D. Which compound has the largest molar absorptivity (ϵ) value?

1. *n*-pentane
2. *n*-hexane
3. (*2E,4E*)-hexa-2,4-diene

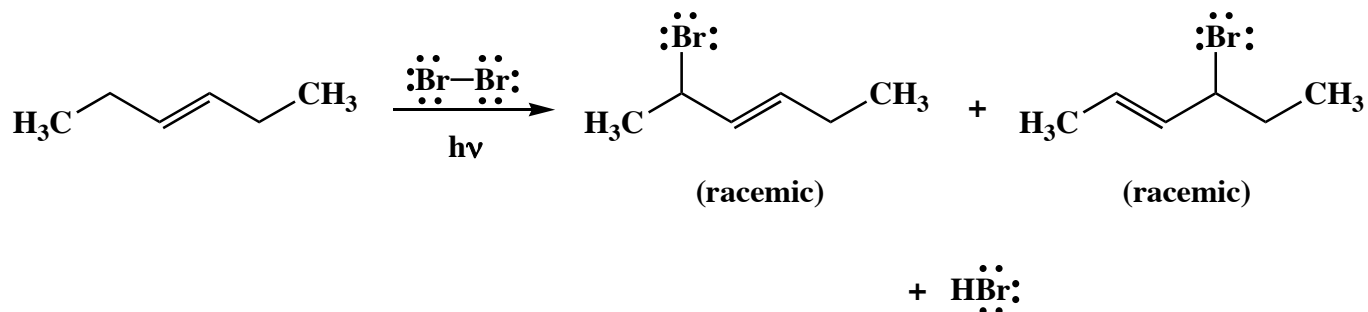
E. The epoxidation of (*E*)-hept-3-ene with *meta*-chloroperoxybenzoic acid is

1. partially enantioselective
2. completely enantioselective
3. partially diastereoselective
4. completely diastereoselective

Name: _____

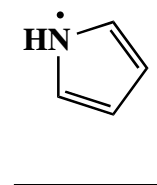
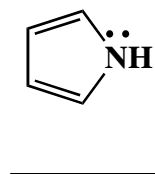
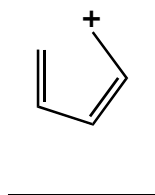
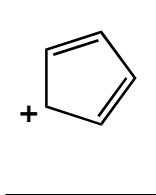
5. (25 points)

Draw the mechanism of the following reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates and denote all unshared electrons, formal charges and countercharges where appropriate. Draw all important resonance contributors for intermediates. Explain why both organic products are racemic.



6. (20 points)

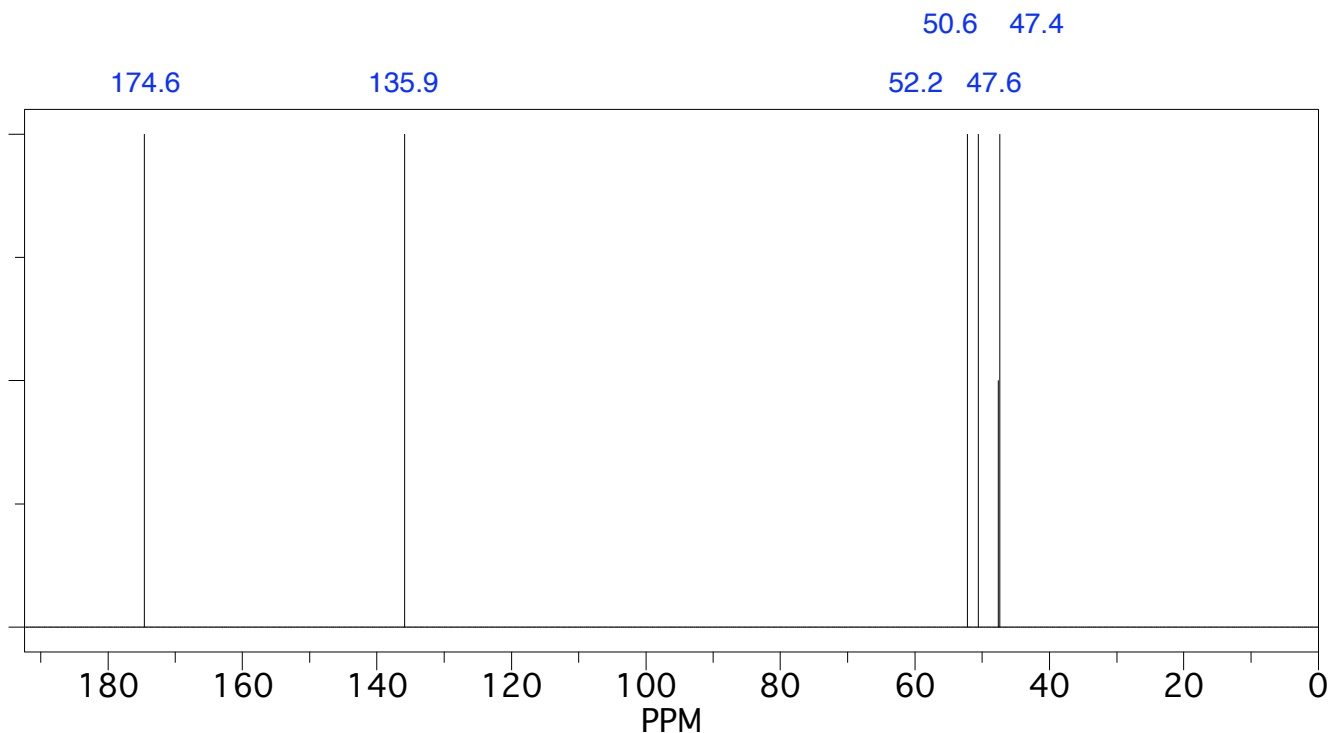
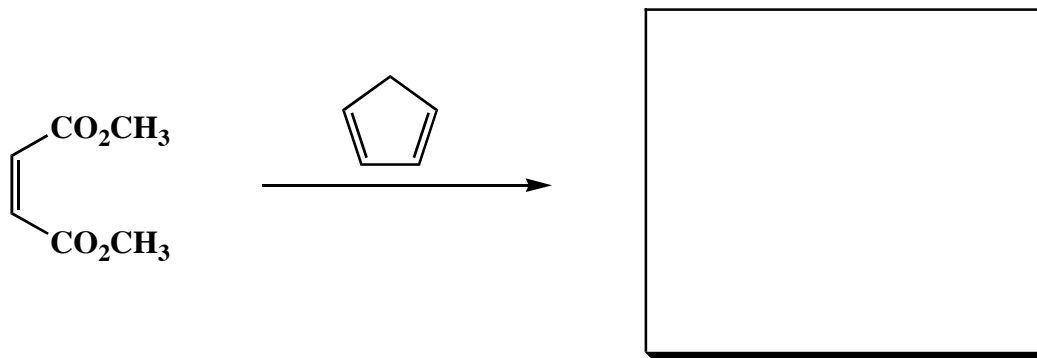
Classify each of the following four (4) species as aromatic, antiaromatic, or nonaromatic (neither aromatic nor antiaromatic).



Name: _____

7. (20 points)

Draw the structure of the expected major organic product of the following reaction. The broadband proton-decoupled ^{13}C NMR spectrum of this product is shown below. Use the spectroscopic data to identify the product. Make clear assignments of all resonances to explain your reasoning. (A ^{13}C NMR correlation table is included on page 8.)



Name: _____

7. (continued)

^{13}C NMR assignments:

chemical shift (ppm) assignment

174.6

135.9

52.2

50.6

47.6

47.4

Congratulations!

1	/25
2	/25
3	/10
4	/25
5	/25
6	/20
7	/20
<hr/> Total:	<hr/> /150